WE CLAIM:

1. A magneto-resistive memory cell, comprising:

a free magnetic layer;

a non-magnetic interlayer, wherein the non-magnetic interlayer comprises a conductor and is in contact with the free magnetic layer;

a pinned magnetic layer, wherein the pinned magnetic layer is in contact with the non-magnetic interlayer; and

an additional pinned magnetic layer, wherein the pinned magnetic layer is between the free magnetic layer and the additional pinned magnetic layer and wherein a magnetization orientation of the pinned magnetic layer is substantially anti-parallel to a magnetization orientation of the additional pinned magnetic layer such that a magnitude of a net magnetic field from the pinned magnetic layer and the additional pinned magnetic layer is too small to substantially affect a magnetization orientation of the free magnetic layer.

2. The magneto-resistive memory cell of Claim 1, wherein the pinned magnetic layer and additional pinned magnetic layer have preselected thicknesses such that a magnitude of a magnetic field of the pinned magnetic layer is substantially equal and substantially opposite to a magnitude of an additional magnetic field of the additional pinned magnetic layer.

3. The magneto-resistive memory cell of Claim 1, wherein a first magnitude of an applied magnetic field for switching the magnetization orientation of the free magnetic layer in a first direction is about 75-125 percent of a second magnitude of an applied magnetic field for switching the magnetization orientation of the free magnetic layer in a direction substantially opposite to the first direction.

4. The magneto-resistive memory cell of Claim 2, wherein a magneto-resistive material comprising the pinned magnetic layer is different from a magneto-resistive material comprising the additional pinned magnetic layer.

5. The magneto-resistive memory cell of Claim 1, wherein the additional pinned magnetic layer comprises a ferromagnetic material with magnetization orientation pinned by an adjacent layer.

6. The magneto-resistive memory cell of Claim 5, wherein the adjacent layer comprises an antiferromagnetic material.

7. The magneto-resistive memory cell of Claim 5, wherein the adjacent layer comprises a permanent magnet material.

8. The magneto-resistive memory cell of Claim 1, wherein the pinned magnetic layer comprises a permanent magnet.

9. The magneto-resistive memory cell of Claim 1, wherein the additional pinned magnetic layer comprises a ferromagnetic material with coercivity sufficiently high such that its magnetization orientation remains fixed in the presence of an applied magnetic field of a magnitude sufficient to switch the magnetization orientation of the free magnetic layer.

10. The magneto-resistive memory cell of Claim 1, wherein the pinned magnetic layer and the additional pinned magnetic layer are separated by a separating layer.

11. The magneto-resistive memory cell of Claim 10, wherein the separating layer is ruthenium.

12. The magneto-resistive memory cell of Claim 1, wherein the nonmagnetic interlayer comprises copper.

13. The magneto-resistive memory cell of Claim 12, formed within a giant magneto-resistive (GMR) memory array.

14. A magneto-resistive memory cell in an integrated circuit, comprising:

a free magnetic layer; and

a pair of pinned magnetic layers on one side of the free magnetic layer, wherein a layer comprising ruthenium separates the two pinned magnetic layers forming the pair and wherein magnetization orientations of the two pinned magnetic layers are anti-parallel such that a first magnitude of an applied magnetic field for switching a magnetization orientation of the free magnetic layer in one direction is substantially equal to a second magnitude of an applied magnetic field for switching the magnetization orientation of the free magnetic layer in a substantially opposite direction.

15. The magneto-resistive memory cell of Claim 14, wherein a first minimum magnitude of an applied magnetic field for switching the magnetization orientation of the

free magnetic layer in a first direction is about 80-120 percent of a second minimum magnitude of an applied magnetic field for switching the magnetization orientation of the free magnetic layer in a direction substantially opposite to the first direction.

16. The magneto-resistive memory cell of Claim 15, wherein the first magnitude of an applied magnetic field is about 90-110 percent of the second magnitude of an applied magnetic field.

17. The magneto-resistive memory of Claim 14, wherein the free magnetic layer and the pair of pinned magnetic layers are separated by a nonmagnetic interlayer comprising a conductor.

18. The magneto-resistive memory of Claim 17, wherein the conductor is copper.

19. A magneto-resistive memory comprising an array of magneto-resistive memory cells, each cell having substantially symmetrical switching field thresholds and comprising:

a free magnetic layer;

a non-magnetic interlayer on one side of the free magnetic layer, wherein the non-magnetic interlayer comprises a conductor and is in contact with the free magnetic layer; and

a pair of pinned magnetic layers, wherein magnetization orientations of the pair of layers is anti-parallel such that a net magnetic moment of the pair of layers is substantially zero.

20. The magneto-resistive memory of Claim 19, wherein an antiferromagnetic layer in contact with a layer of the pair of pinned magnetic layers fixes the magnetization orientation of that layer, wherein the layer of the pair of pinned magnetic layers in contact with the antiferromagnetic layer is farther from the free magnetic layer than another layer in the pair of pinned magnetic layers.

21. The magneto-resistive memory of Claim 19, wherein a layer of the pair of pinned magnetic layers comprises a permanent magnet.

22. The magneto-resistive memory of Claim 19, wherein a layer of the pair of pinned magnetic layers comprises a magnetic material with coercivity sufficiently high such that its magnetization orientation remains fixed in the presence of an applied magnetic field.

23. The magneto-resistive memory of Claim 19, wherein the pair of pinned magnetic layers are separated by a separating layer comprising ruthenium.

24. The magneto-resistive memory of Claim 19, wherein the nonmagnetic interlayer comprises copper.

25. A method of constructing a magneto-resistive memory cell, comprising:

selecting a ferromagnetic material for a first magnetic layer;

selecting an additional ferromagnetic material for a second magnetic layer;

selecting thicknesses for each of the first magnetic layer and the second magnetic layer such that a magnitude of a magnetic field of the first magnetic layer is substantially equal to a magnitude of a magnetic field of the second magnetic layer;

forming a non-magnetic interlayer, wherein the non-magnetic interlayer comprises copper;

forming the first magnetic layer;

forming the second magnetic layer;

forming a first fixed magnetic layer by applying a first magnetic field to fix a magnetization orientation of the first magnetic layer; and

forming a second fixed magnetic layer by applying a second magnetic field to fix a magnetization orientation of the second magnetic layer in an opposite direction from the magnetization orientation of the first magnetic layer.

26. The method of claim 25, wherein the first magnetic layer and the second magnetic layer are formed sequentially.

27. The method of claim 25, wherein the first magnetic layer and the second magnetic layer are formed of substantially the same ferromagnetic material.

28. The method of claim 25, wherein the first magnetic layer and the second magnetic layer have substantially the same thickness.

29. The method of claim 25, wherein the conductor comprises copper.

30. A method of constructing a magneto-resistive memory cell, comprising:

forming a first magnetic layer;

forming a non-magnetic interlayer, wherein the non-magnetic interlayer comprises a conductor;

forming a second magnetic layer without forming another magnetic layer between the first magnetic layer and the second magnetic layer;

forming a first fixed magnetic layer by applying a first magnetic field to fix a magnetization orientation of the first magnetic layer; and

forming a second fixed magnetic layer by applying a second magnetic field to fix a magnetization orientation of the second magnetic layer in an opposite direction from the magnetization orientation of the first magnetic layer, wherein a set of ferromagnetic and antiferromagnetic coupling fields of the second fixed magnetic layer balance an additional set of ferromagnetic and antiferromagnetic coupling fields from the first fixed magnetic layer.

31. The method of Claim 30, wherein the first magnetic layer and the second magnetic layer are formed sequentially.

32. The method of Claim 31, wherein the conductor comprises copper.